2-20-76

Instruction Manual
Model rsb

NJE Corporation
Dayton, N. J. 08810

NOTE:

Power supply should not be returned to the factory for in-warranty repair unless the unit remains inoperable after referring to the troubleshooting section of this manual and carrying out the instructions therein.

Any power supply returned to the factory for repair with blown fuse and/or improperly adjusted OVP or current limit settings will not be treated as in-warranty repair. Service and handling charges will apply.

For repair service or advice concerning an application problem please contact the nearest NJE Field representative or factory.

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SECTION I

THEORY OF OPERATION

1. GENERAL DESCRIPTION:

Refer to Chart 1 in Appendix B for converting component designations in following discussion to those on schematic.

The NJE RS line of modular power supplies are all silicon solid state circuits and include the utilization of intergrated circuits. Additionally, all supplies are series regulated and are manufactured with high quality industrial grade components. The quality of the power supply is intended to be consistent with that required for the most sophisticated and/or expensive electronic system in use today. These power supplies provide many features which provide the user with the maximum flexibility consistent with competitive cost, simplicity of design and long term reliability. These features include the following:

(OVP) Over Voltage Protection: SCR crowbar to limit maximum output voltage. Normally factory set at 1.5V or 20% (whichever is greater) above the nominal voltage range. OVP may be readjusted by customer via accessible adjustment.

Current Limiting: Current limiting may be set to limit maximum current from 75% to 120% of rated current. This current limiting adjustment is located internally and can be readjusted by customer.

Remote Programming: 1 volt per volt or 500 ohms per volt (output terminal strip).

Remote Sensing: Sensing terminals separate from the load terminals provide regulation of the voltage at the load rather than regulation of the voltage at the power supply output terminals. This eliminates the loss of load regulation due to the voltage drop in the wires connecting the supply to the load.

AC Input: All units are designed to operate to 47 HZ to 440 HZ. (No derating to 50 HZ operation). Input voltage range is 105 to 132 volts and optionally available is 205 to 265 volts AC.

Fault Protection: All power supplies are protected with primary fuses and/or circuit breakers. In addition most units have secondary fusing.

Cooling: All power supplies are convection cooled and will meet published specification without any additional heat sink and/or forced air cooling.

The circuits used are extremely reliable and feature a high degree of simplification. The circuit simplification results in standardization of material and also gives greater reliability due to the reduction of components used in the basic circuits. The overall design philosophy utilized in this product line is based on standardization, simplicity, reliability and high quality.

2. DETAILED CIRCUIT DESCRIPTION:

Each module in the RS line is similiar in circuit structure and may be represented by five basic functional blocks. (See Figure 1).

A. Transformer

B. Bias Circuit - 1) Rectifier and Filter
2) Regulator IC

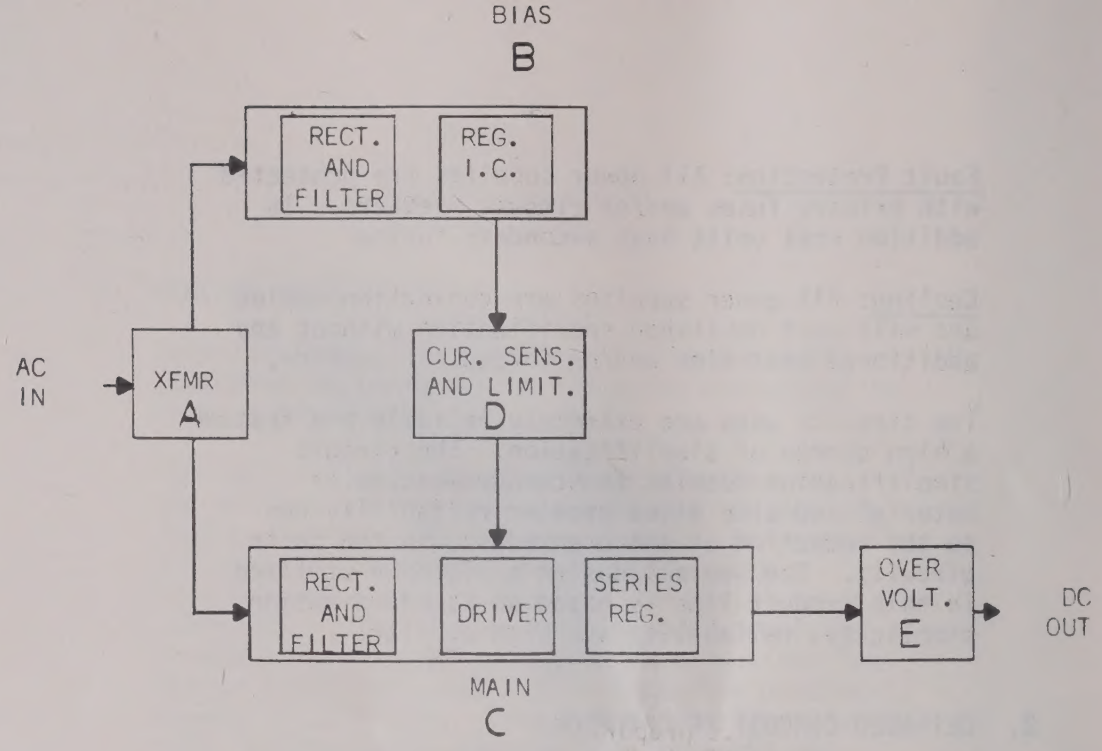
C. Main Circuit - 1) Rectifier and Filter
2) Series Regulator
3) Driver

D. Current Sensing and Limiting Circuit

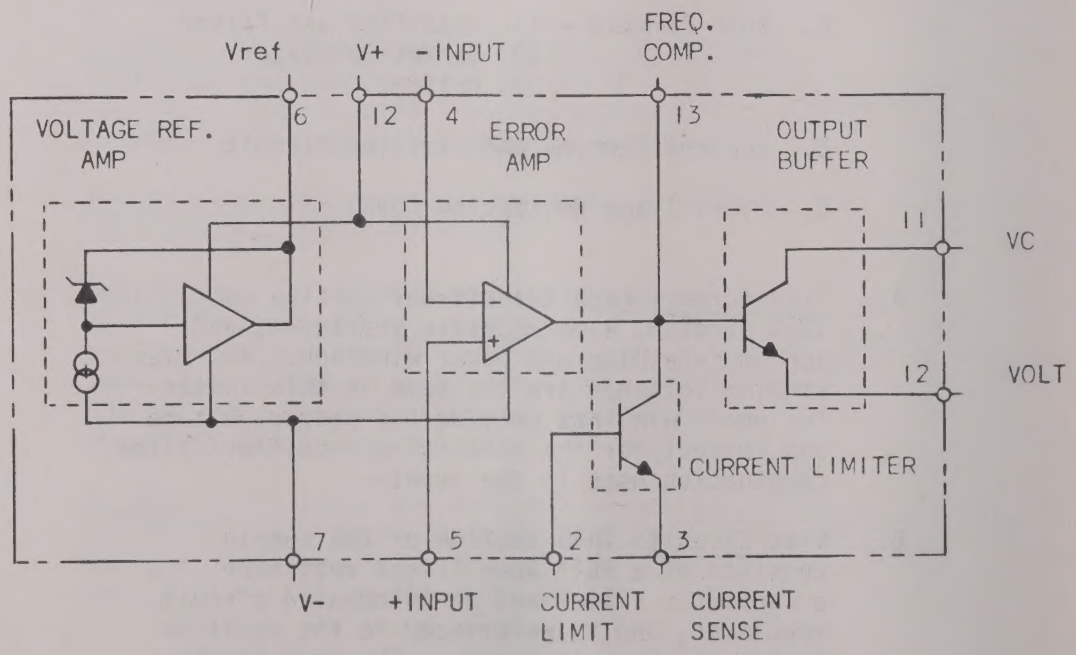
E. Overvoltage Protection (OVP)

A. Transformer: Each transformer section has a 115V winding, electrostatic shielding, and appropriate bias and power windings. All bias winding voltages are the same in this series. The power windings provide the proper voltage and current for the particular rectifier/filter combination used in the supply.

B. Bias Circuit: This section of the supply consists of a full wave bridge rectifier, a capacitor filter and an integrated circuit regulator, and is referenced to the positive output of the main supply. The bias supply utilizes a 12 volt zener diode.



BLOCK DIAGRAM
FIGURE 1



REGULATOR IC SCHEMATIC
FIGURE 2

The equivalent circuit (Figure 2) of the IC regulator shows four (4) basic circuits within the package.

1) A reference voltage source
2) A differential error amplifier
3) An output buffer
4) A current limit amplifier

Resistors RX1 and RX2 form a divider network providing the reference voltage for the error amplifier.

Resistors RX3, RX4 and RX5 form the divider network providing the output proportional voltage for the error amplifier.

The error amplifier amplifies the voltage difference between the reference voltage and the output proportional voltage. The error amplifier output acts, through one or more current amplifiers, to adjust the pass transistor(s) drive until the output proportional voltage equals the reference voltage.

C. Main Circuit: This section is a full wave rectifier filtered by a capacitor and regulated by means of a series regulator QX1 through QX2. Depending on the power requirements, the series regulator consists of two or more NPN silicon power transistors connected in parallel with each pass transistor having an emitter resistor. The driver stage for the pass transistor(s) is a current driver circuit.

The error voltage of the IC regulator is converted by QX3 (current generator). This converted signal is utilized by the current drivers QX4, QX5 and QX6 to control the output of the series regulator.

D. Current Sensing and Limiting Circuit: This section of the supply becomes effective when the output current reaches the preset limit of the supply.

The limit amplifier, an integral part of the IC voltage regulator, turns on, reducing the output voltage of the error amplifier of the IC. This results in reducing the power supply output voltage. The reduction of output voltage results in a corresponding reduction of output current which insures against excessive power dissipation in the series pass transistor(s).

E. Overvoltage Protection: All power supply units utilize a silicon unilateral switch (SUS) as an SCR driver. The anode of the SUS is biased by a resistor divider network consisting RX6, RX7 and RX8 or RX9 from the output of the power supply for all units rated at 12 volts and over or from the bias 12 volt zener in 5 and 10 volt rated units. When the output voltage increases to a level whereby the anode voltage of the SUS reaches its trigger point, the SUS switches on and fires the SCR crowbar shorting the power supply output terminals. Simultaneously the current limiting circuitry reduces the output current drive to an acceptable level.

SECTION II

OPERATION

PLEASE READ THESE INSTRUCTIONS BEFORE OPERATING THE SUPPLY

1. UNPACKING AND INSPECTION:

   Temporarily save all packing material. Read and save all instruction material. Inspect the physical condition of the unit for possible shipping damage. Particularly look for broken meters, controls, fuse holders, and dents, loose hardware and missing parts. Do not operate the unit if obvious or suspected mechanical damage has occurred.

2. ADJUSTMENTS:

   To place the supply in operation, connect a suitable load to the indicated load terminals with the sensing leads either jumpered to the output terminals at the supply (as when the unit is shipped) or connected remotely at the load (observe polarity).

   NOTE

   Sensing leads must never be left disconnected.

   Apply AC power to the indicated terminals. Output adjustment is achieved by a pot adjustment through an appropriately marked hole on the PSA through PSEE units. Output adjustment on the PSF, PSG and PSH units is accomplished by means of a locking type pot adjustment located on the front panel.

   Over-voltage protection is factory set at 20% or 1.5 volts above nominal output (whichever is greater). The functioning of the OVP may be checked either by advancing the output adjustment or lowering the OVP adjustment until crowbarring occurs.

   OVP Adjustment: To set the OVP trip level, perform the following:

   1) Monitor the output voltage with a digital voltmeter.

   2) Advance OVP control to its extreme clockwise position.

   3) Set the voltage adjust control to the desired

output trip level with the supply unloaded. If additional voltage range is required an external resistance between the minus sense and the minus output terminal (500 ohm/volt) may be utilized.

4) Retard the OVP control slowly (CCW) to the point of OVP trip.

5) Remove AC power (to reset crowbar).

6) Retard the voltage adjust pot (CCW). On the EE units reset the circuit breaker.

7) Apply AC power. On the PSF, PSG, and RSH units reset circuit breakers.

8) Reset voltage adjust pot for proper output voltage.

In an environment where external system leads cause noise or spiking to be superimposed on the DC output, the OVP may be mistriggered. To change the response time of the OVP circuit, which is factory set at approximately 100 US, a capacitor change is required. Refer to Table #1 for capacitor values required to give desired response time of OVP circuit.

TABLE 1

CAPACITOR CX1	RESPONSE TIME
0.047 UF	50 US
0.2 UF	200 US
0.3 UF	300 US
0.47 UF	500 US

Current Limit Adjustment: Factory setting of the current limit adjustment is at 10% to 15% above the rated nominal current of the units. In an application where the limit is to be changed the following procedure applies:

1) Provide a suitable load that will draw the new desired limiting current. Also set the current limit pot, RX10, located on the main printed circuit board, to the maximum clockwise position.

2) Monitor the output voltage on an oscilloscope (A-C coupled 5 MV./CM. scale) and a digital voltmeter.

3) Rotate the current limit pot counter-clockwise until the ripple content of the output voltage increases by several millivolts. The digital voltmeter should show a slight drop in output voltage.

3. CONNECTIONS:

The RSA through RSEE units have barrier strip terminals for input and output connections; the RSF through RSH rack units have output studs. In either case, the positive or negative output terminal may be grounded or operated floating up to a maximum of 500 volts with respect to chassis. For recommended wire size and terminal board functions, see outline drawing.

NOTE

Output terminals of power supply should never exhibit a reverse voltage. A protective power diode should be connected across power supply outputs (anode to negative terminal) in systems where other power sources are used.

Remote Programming: The power supply output voltage may be remotely programmed by a voltage source (1 volt/volt) or a resistor (500 ohms/volts). See Figures 5 and 7 for connections.

Remote Sensing: The unit has provisions whereby the output voltage may be regulated directly at the load terminals. Under heavy loads poor regulation may occur at the load due to the voltage drop in the load leads if remote sensing is not used. Shielded wires should be used for connections between remote load and sensing

terminals on power supply. Wires of sufficient size should be used for load leads to minimize voltage drop in these leads. See Figure 4 for remote sensing connections; for local sensing, see Figure 3.

Mounting: When mounting the unit in an installation, care must be taken to provide sufficient air ventilation. The rating chart (Table 1) shows output currents at ambient temperatures. The ambient temperature is defined as the temperature one inch from each surface of the supply, excluding the top.

4. TEST SETUPS AND CONNECTION DIAGRAMS:

CONNECTION DIAGRAMS FOR PSA

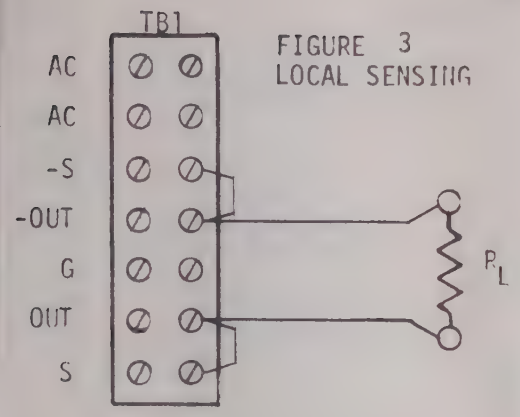


FIGURE 3
LOCAL SENSING

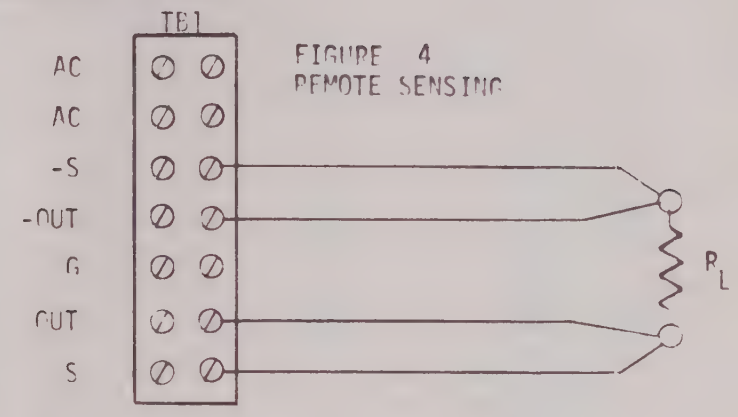


FIGURE 4
REMOTE SENSING

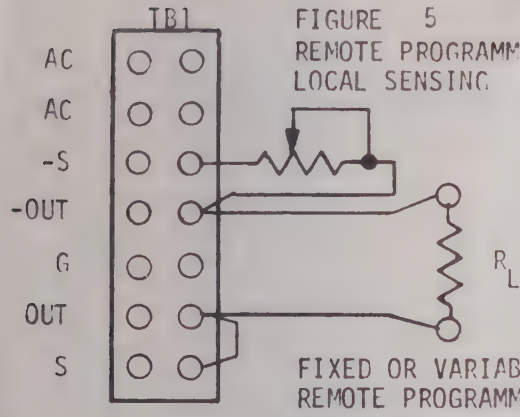


FIGURE 5
REMOTE PROGRAMMING
LOCAL SENSING

FIXED OR VARIABLE
REMOTE PROGRAMMING
RESISTOR

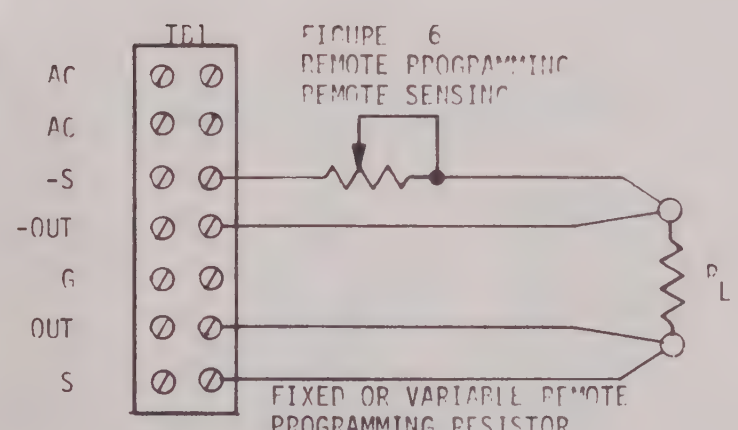


FIGURE 6
REMOTE PROGRAMMING
REMOTE SENSING

FIXED OR VARIABLE REMOTE
PROGRAMMING RESISTOR

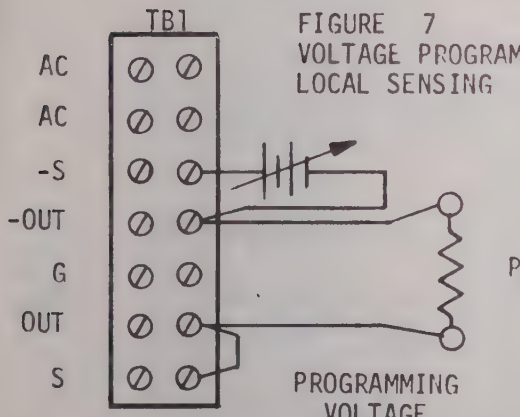


FIGURE 7
VOLTAGE PROGRAMMING
LOCAL SENSING

PROGRAMMING
VOLTAGE

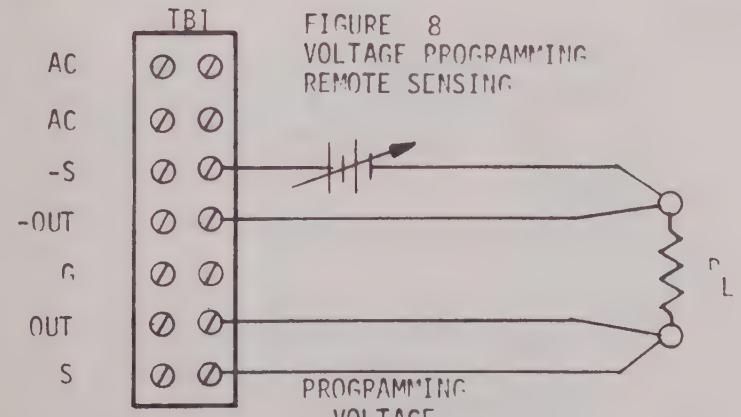


FIGURE 8
VOLTAGE PROGRAMMING
REMOTE SENSING

PROGRAMMING
VOLTAGE

NOTE: FOR REMOTE SENSING A SHIELDED CABLE SHOULD BE USED.

CONNECTION DIAGRAMS FOR B, C, CC, D AND E

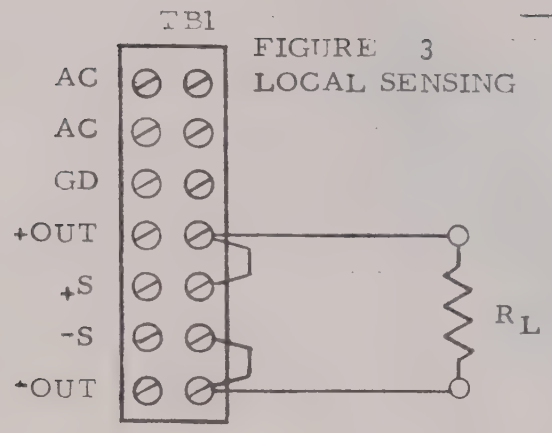


FIGURE 3
LOCAL SENSING

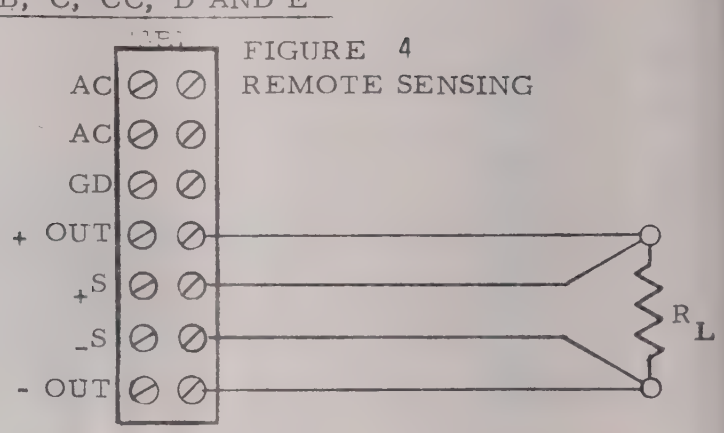


FIGURE 4
REMOTE SENSING

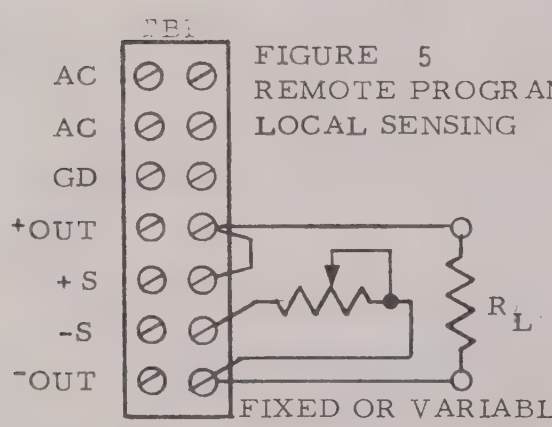


FIGURE 5
REMOTE PROGRAMMING
LOCAL SENSING

FIXED OR VARIABLE REMOTE PROGRAMMING RESISTOR

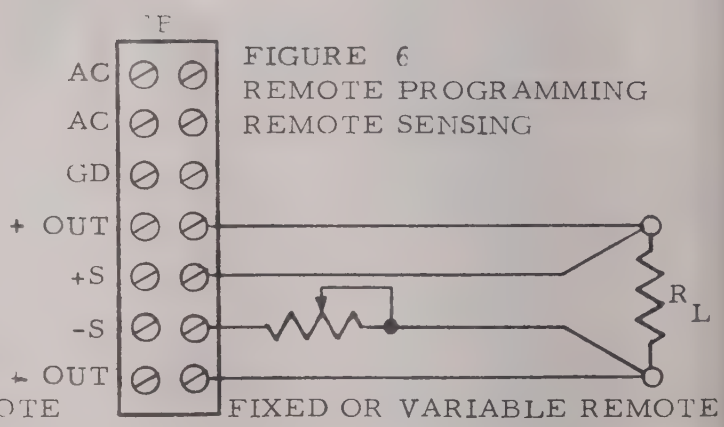


FIGURE 6
REMOTE PROGRAMMING
REMOTE SENSING

FIXED OR VARIABLE REMOTE PROGRAMMING RESISTOR

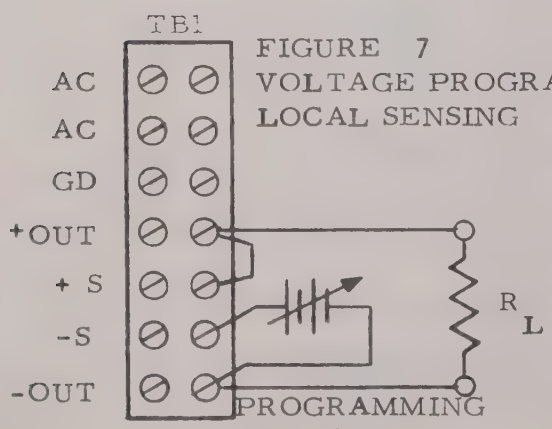


FIGURE 7
VOLTAGE PROGRAMMING
LOCAL SENSING

PROGRAMMING VOLTAGE

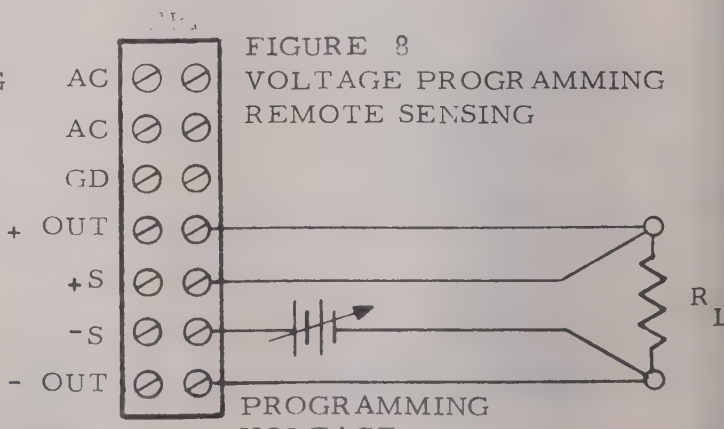


FIGURE 8
VOLTAGE PROGRAMMING
REMOTE SENSING

PROGRAMMING VOLTAGE

NOTE: FOR REMOTE SENSING A SHIELDED CABLE SHOULD BE USED.

CONNECTION DIAGRAMS FOR RSEE

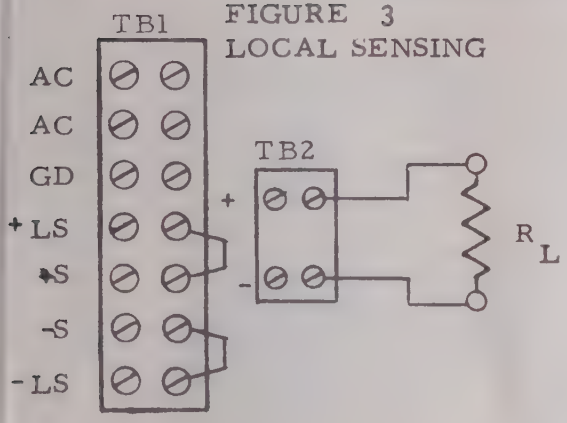


FIGURE 3
LOCAL SENSING

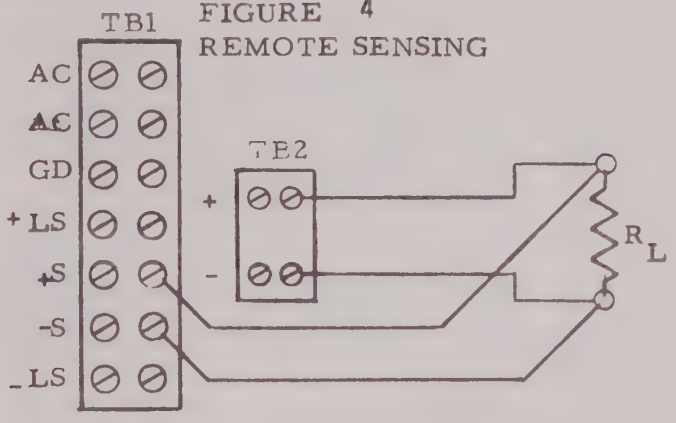


FIGURE 4
REMOTE SENSING

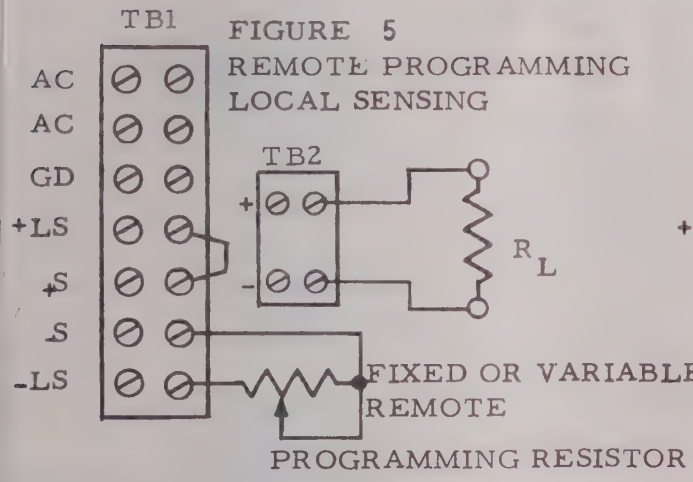


FIGURE 5
REMOTE PROGRAMMING
LOCAL SENSING

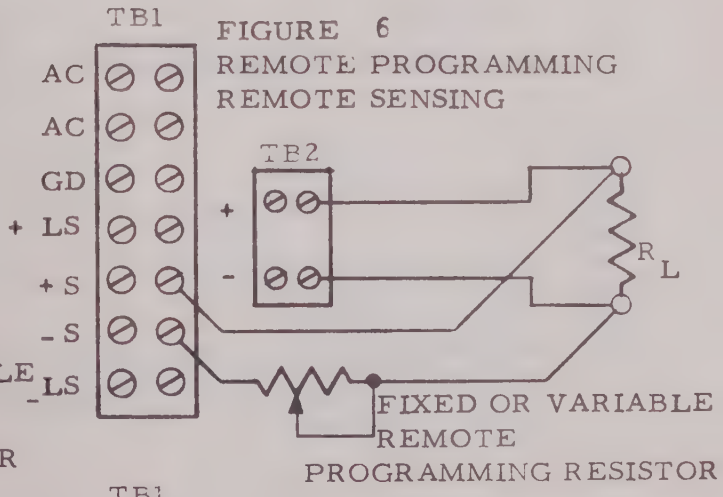


FIGURE 6
REMOTE PROGRAMMING
REMOTE SENSING

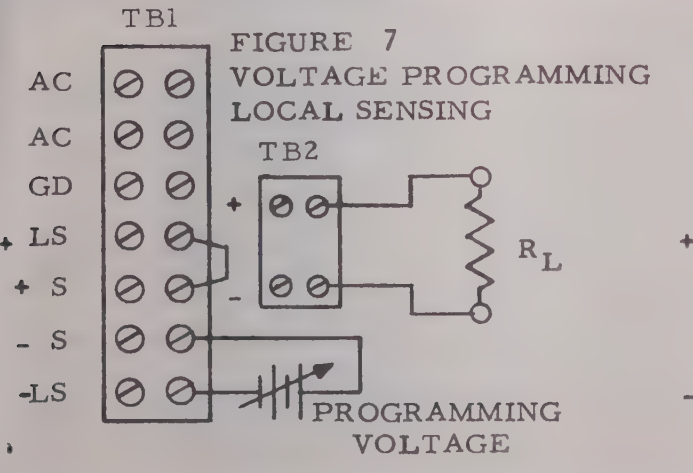


FIGURE 7
VOLTAGE PROGRAMMING
LOCAL SENSING

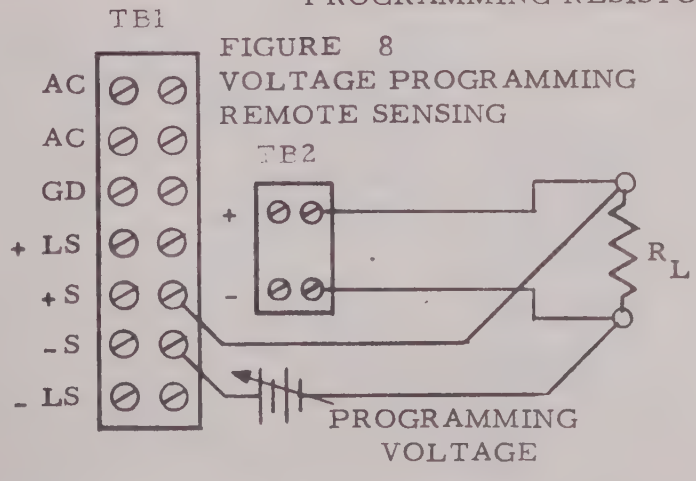


FIGURE 8
VOLTAGE PROGRAMMING
REMOTE SENSING

NOTE: FOR REMOTE SENSING A SHIELDED CABLE SHOULD BE USED

CONNECTION DIAGRAMS FOR RSF, G AND H

FIGURE 3
LOCAL SENSING

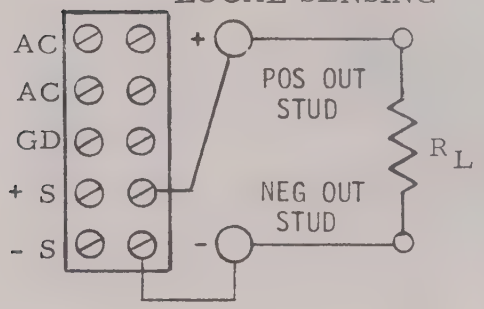


FIGURE 4
REMOTE SENSING

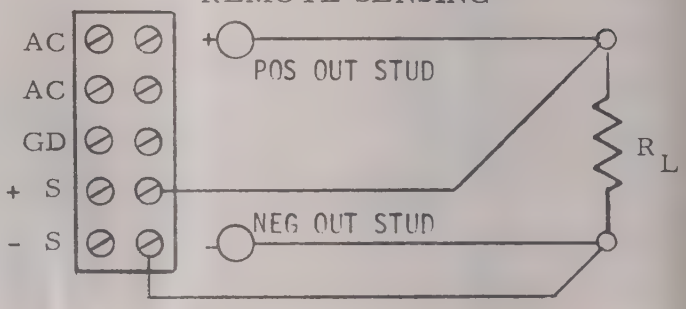


FIGURE 5
REMOTE PROGRAMMING
LOCAL SENSING

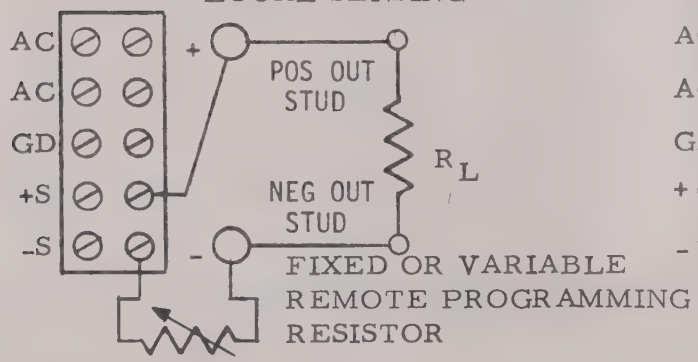


FIGURE 6
REMOTE PROGRAMMING
REMOTE SENSING

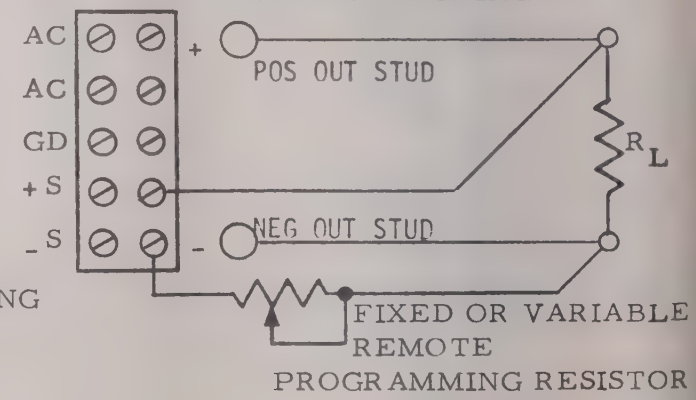


FIGURE 7
VOLTAGE PROGRAMMING
LOCAL SENSING

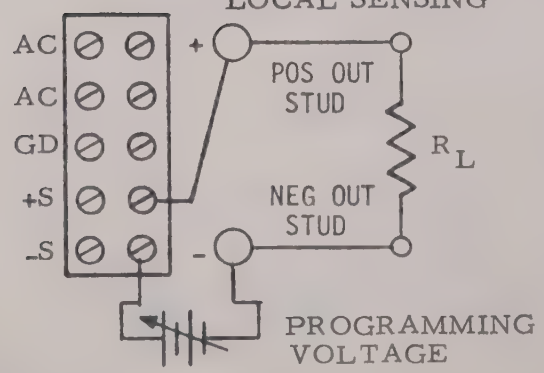
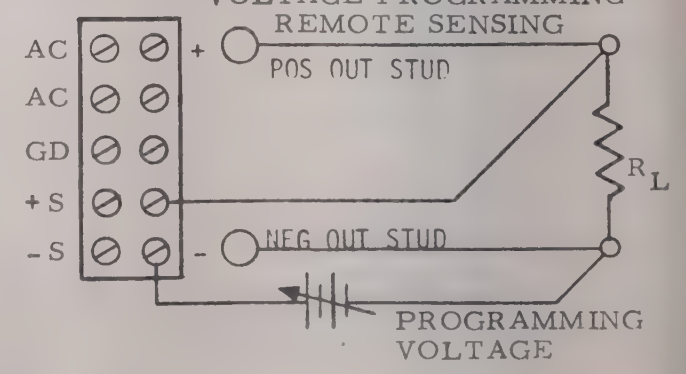


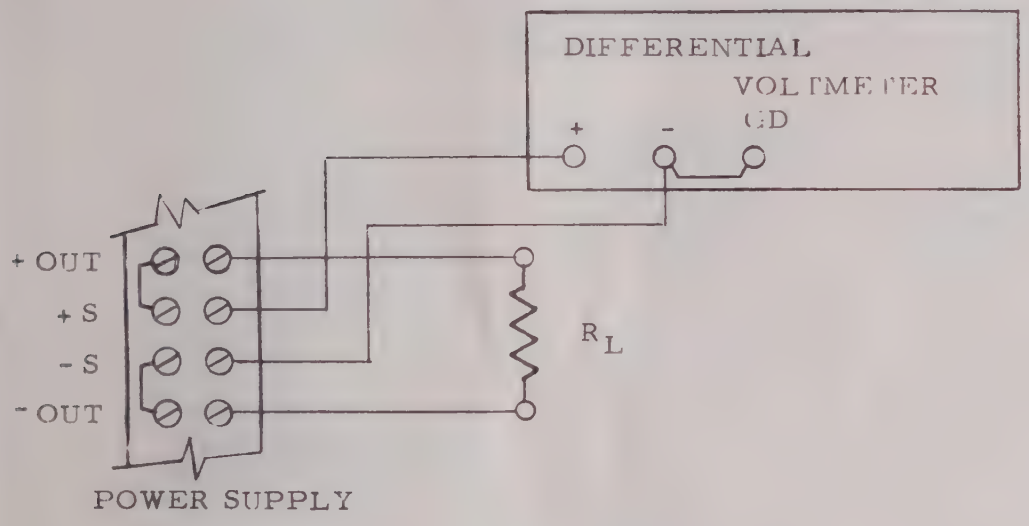
FIGURE 8
VOLTAGE PROGRAMMING
REMOTE SENSING



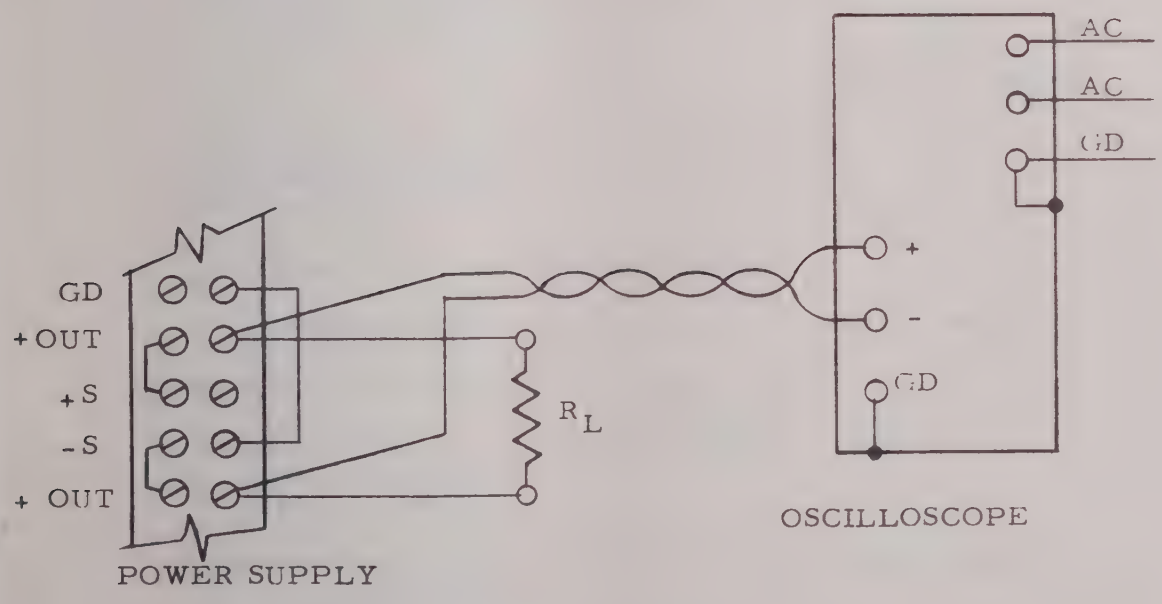
NOTE: FOR REMOTE SENSING A SHIELDED CABLE SHOULD BE USED

TEST SETUPS

LOAD AND LINE REGULATION TEST SET UP



RIPPLE AND NOISE TEST SET UP



SECTION III

REPAIR, TROUBLESHOOTING, AND MAINTENANCE

An understanding of the operation of power supplies in general, and this series in particular, plus suitable test equipment and replacement parts, is a requirement for proper troubleshooting of a defective supply.

TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	SOLUTION
No Output	AC Input	Check TB pin 1 & 2 for AC Input power.
	Blown Fuse	Replace
	Wiring	Check positive and negative sense leads for proper termination and polarity.
	OVP Tripped	Output voltage set too high or OVP set too low. See OVP setup procedure.
Output Voltage		
Too High	Wiring	Check positive and negative sense leads for proper termination.
	Voltage Adjustment	Pot Adjustment
Too Low	Voltage Adjustment	Pot Adjustment
	OVP Tripped	See OVP set up procedure
	Current Limit	Check for excessive load. See setup procedure.
No Adjustment	Wiring	Sense lead termination incorrect
	Current Limit	Check for excessive load. See setup procedure.

APPENDIX A

ELECTRICAL SPECIFICATIONS

Input: 105-132 volts; 47-440 HZ (no derating for 50 HZ operation).

Load Regulation: 0.01% for a no load to full load change in output current.

Line Regulation: 0.01% for any input voltage change within 105-132 volts.

Ripple and Noise: 3MV PP; 1.0 MV RMS (DC to 10 MegaHZ).

Temperature Coefficient: (With remote programming resistor) less than 0.01%/^{o}C change in output following a 30 minute warm up.

Temperature Ratings: Operating Temperature- 20^{o}C to +71^{o}C
Storage Temperature- 55^{o} to +85^{o}C

Stability: Better than 0.1% total drift for 8 hours following a 30 minute warm up under constant ambient conditions.

Overshoot: No voltage spikes for turn on, turn off, or power failure.

Transient Recovery Time: Less than 50 microseconds to recover to within 0.25% for line voltage changes of ± 10% about nominal or for a 50% load change from nominal.

Current Protection: Internally adjustable electronic overload and short circuit protection with automatic reset upon removal of load, adjustable from 75% to 120% of nominal rating.

RSA Units "Only": Internally adjustable electronic current regulation that will protect load and also provide current regulation within 1% at full load and adjustable over a range of 10% to 120%.

Remote Programming: 1 volt/volt or 500 ohms/volt. (For RSA units, see below).

RSA Only:

07A,B,C	500 ohm/volt
0 15 A	600 ohm/volt
0 32 B,C	600 ohm/volt
024, 060, 0120	800 ohm/volt

Remote Sensing: Sensing terminals, which are separate from the load terminals, permit the unit to provide regulation of the voltage at a remote load rather than at the power supply output terminals.

Cooling: Convection cooling on all models.

Controls: Output voltage adjust, over voltage setting adjust, and current limit adjust (internal).

OVP (Over Voltage Protection): Crowbar provided to limit maximum output voltage. Standard factory setting is at 1.5V or 20% (which is greater) above nominal voltage.

Options: (-230) change in normal input voltage to 205-265V AC.

(-E) Mil type conformal coating over all PC boards.

Mechanical: Finish - Modular - Gold Irridite Chassis

Black Identification

Rack Mounted Units:

Blue color chip #25109 (Fed. Std. 595) with white lettering on front panel: gold irridite chassis.

OUTPUT CURRENT RATINGS

Voltage (Range)	CURRENT 40 C	50 C	60 C	71 C	Model No.	Price	OVP	OVP Adj. Range
0-7V	.85	.75	.70	.55	RSA-07A-OVP	$ 79.00	incl.	4-10V
0-7V	1.7	1.5	1.4	1.1	RSA-07B-OVP	89.00	incl.	4-10V
0-7V	2.0	1.9	1.6	1.1	RSA-07C-OVP	99.00	incl.	4-10V
0-15V	.45	.4	.38	.38	RSA-015A-OVP	79.00	incl.	6-20V
0-15V	.9	.8	.75	.55	RSA-015B-OVP	89.00	incl.	6-20V
0-15V	1.2	1.1	1.0	.8	RSA-015C-OVP	99.00	incl.	6-20V
0-24V	.8	.75	.70	.60	RSA-024-OVP	99.00	incl.	15-31V
0-32V	.66	.60	.50	.32	RSA-032	99.00	10.00	15-42V
0-60V	.35	.31	.28	.25	RSA-060	99.00	20.00	20-70V
0-120V	.15	.10	.10	.10	RSA-0120	109.00	20.00	20-140V

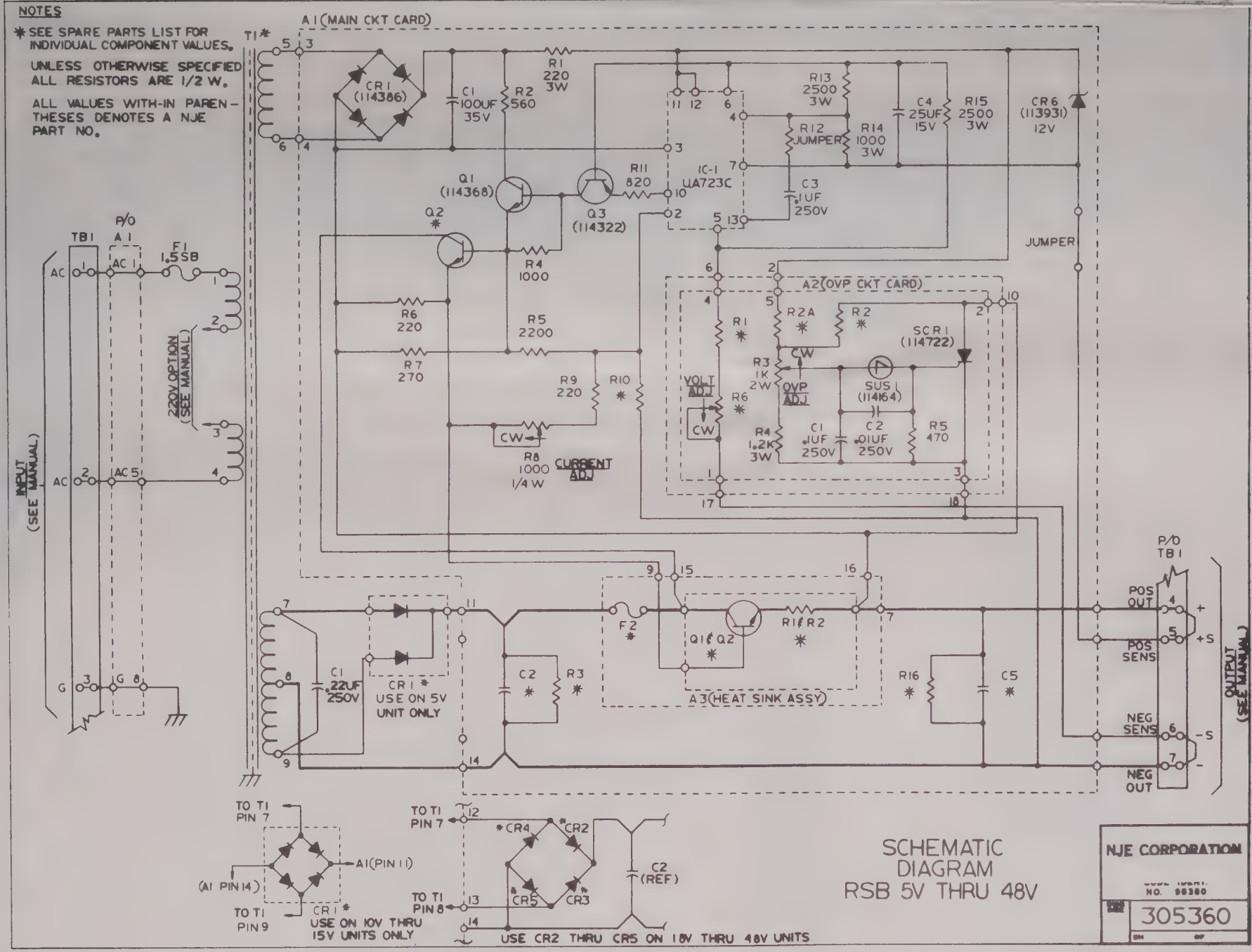
Voltage (Nominal)	Voltage (Range)	CURRENT				Model No.
		40°C	50°C	60°C	71°C	
5V	4.5 TO 5.5V	6.0	5.2	3.9	2.3	RSB-5-OVP
		9 0	7.6	6.0	4.3	RSC-5-OVP
		12.0	10 2	9.0	6.2	RSCC-5-OVP
		15 0	13 0	11 0	7.3	RSD-5-OVP
		22 0	20.0	18.0	11.0	RSE-5-OVP
		34.0	27.0	23.0	19.0	RSEE-5
		60.0	51.0	41.0	31.0	RSF-5
		100 0	94.0	78.0	57.0	RSG-5
		140 0	120 0	105.0	82.0	RSH-5
10V	9 TO 11V	4 0	3.6	3.2	2.8	RSB 10-OVP
		6.0	5.2	3 9	2.3	RSC-10-OVP
		9.0	8.1	7.2	6.3	RSCC-10-OVP
		12.0	10.8	9.6	9.48	RSD-10-OVP
		18 0	16.2	14.4	12.6	RSE-10-OVP
		27.0	24.3	21.6	18.9	RSEE-10
		39.0	35.1	31.2	27.3	RSF-10
		64.0	57 6	51.2	44.8	RSG 10
		87 0	78.3	69.6	60.9	RSH-10
12V	11 TO 13V	3.6	3.24	2.88	2.52	RSB-12-OVP
		5 5	4 95	4.40	3.85	RSC-12-OVP
		8 0	7.2	6 4	5.6	RSCC-12-OVP
		11 0	9.9	8 8	7.70	RSD-12-OVP
		16 0	14.4	12 8	11.2	RSE-12-OVP
		23.0	20 7	18 4	16.1	RSEE-12
		34.0	30 6	27 2	23.8	RSF-12
		56.0	50 4	44.3	39.2	RSG-12
		80 0	72 0	64 0	56.0	RSH-12
15V	14 TO 16V	3 0	2.7	2 4	2.10	RSB-15-OVP
		5.0	4.5	4 0	3.5	RSC-15-OVP
		7.0	6.6	6 0	5.0	RSCC-15-OVP
		10.0	9 3	8.7	5.8	RSD-15-OVP
		15 0	13 5	12 0	9 0	RSE-15-OVP
		21 0	20 0	17 5	14.0	RSEE-15
		30.0	27 0	24 0	21.0	RSF-15
		50 0	46 5	39 5	31.0	RSG-15
		72.0	64.3	57.6	50 4	RSH 15
18V	17 TO 19V	2 6	2 34	2 08	1.82	RSB-18-OVP
		4 5	4 3	3 8	2.7	RSC-18-OVP
		6 0	5.7	5 2	4.5	RSCC-18-OVP
		9 0	8 4	7.8	5.7	RSD-18-OVP
		14 0	12.5	11.0	8.9	RSE-18-OVP
		18 0	16 5	13 5	11.5	RSEE-18
		28.0	25 2	22 4	19.6	RSF-18
		42 0	30 0	24 5	18.5	RSG-18
		64 0	57 6	51 2	44 8	RSH-18

Voltage (Nominal)	Voltage (Range)	CURRENT				Model No.
		40°C	50°C	60°C	71°C	
20V	19 TO 21V	2.4	2.16	1.92	1.68	RSB-20-OVP
		4 2	3.9	3.5	2.5	RSC-20-OVP
		5.5	5.0	4.5	3.9	RSCC-20-OVP
		8.0	7.5	7.0	5.2	RSD-20-OVP
		13.0	11.5	10.5	9.1	RSE-20-OVP
		17 0	15.0	13.5	11.0	RSEE-20
		25.0	22.5	20.0	17.5	RSF-20
		39.0	35.0	31.0	24.0	RSG-20
		60.0	52 0	42.0	34.0	RSH-20
24V	23 TO 25V	2.0	1 8	1.6	1.4	RSB-24-OVP
		3.6	3.4	3 1	2.2	RSC-24-OVP
		5.0	4.6	1 2	3 7	RSCC-24-OVP
		7.5	7.0	6 4	5 3	RSD-24-OVP
		12 0	11.0	10.0	8 5	RSE-14-OVP
		15 0	13.5	12 0	10.5	RSEE-24
		24.0	20.0	16.5	13.0	RSF-24
		36.0	29.5	24 0	18.0	RSG-24
		52.0	47 0	42.0	35.0	RSH-24
28V	27 TO 29V	1.8	1.62	1.44	1.26	RSB-28-OVP
		3 0	2.7	2 6	1.8	RSC-28-OVP
		4.5	4.4	4.0	3.6	RSCC-28-OVP
		6.5	6.0	5.5	5.0	RSD-28-OVP
		11.0	10.0	8 9	7.8	RSE-28 OVP
		14.0	12.5	11 0	9.3	RSEE-28
		20.0	18.0	16 0	14.0	RSF-28
		33.0	30.0	25.0	19.0	RSG-28
		47.0	41.0	33 0	27.0	RSH-28
36V	34.5 TO 37.5V	1.3	1.17	1 04	.91	RSB-36-OVP
		2 3	2 1	1.9	1.5	RSC-36-OVP
		3 5	3 4	3 2	2.8	RSCC-36-OVP
		5.7	5 13	4 56	3 99	RSD-36-OVP
		8 5	7 53	6 8	5 35	RSE-36-OVP
		11 0	10.5	9 2	7 7	RSEE 36
		15 0	12 6	11.5	8.6	RSF-36
		25.0	22 5	18 0	14.5	RSG 36
		40.0	32 0	28 0	20.0	RSH-36
48V	46 TO 50V	1 1	1 0	.94	.87	RSB-48-OVP
		1.8	1 6	1.5	1.1	RSC-48-OVP
		3.0	2 9	2.6	2.5	RSCC-48-OVP
		4.2	3.78	3 36	2.94	RSD-48-OVP
		6 5	5 9	5.3	4.7	RSE-48-OVP
		8.0	7 4	6.8	5.7	RSEE-48
		12 0	11.0	9.0	7.2	RSF-48
		19 0	15 5	13 5	10 0	RSG-48
		28.0	25 2	22.4	19.6	RSH-48

APPENDIX B

CHART 1

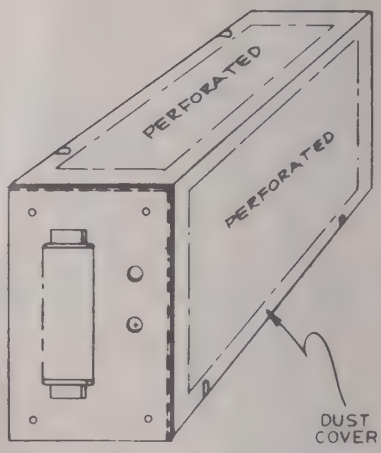
MANUAL REFERENCE DESIG.	ACTUAL COMPONENT REFERENCE DESIGNATIONS (BY MODEL TYPE) AS INDICATED IN POWER SUPPLY, ELECTRICAL PARTS LIST AND SCHEMATIC									
	RSA	RSB	RSC	RSCC	RSD	RSE	RSEE	RSF	RSG	RSH
RX1	A1R18	A1R13	A1R12	A1R11	A1R16	A1R16	A1R16	A1R14	A1R14	A1R14
RX2	A1R19	A1R14	A1R13	A1R10	A1R18	A1R18	A1R18	A1R16	A1R16	A1R16
RX3	A1R20	A1R15	A1R14	A1R12	A1R17	A1R17	A1R17	A1R15	A1R15	A1R15
RX4	A2R1	A2R1	A2R1	A1R13	A1R9	A1R9	A1R9	A1R18	A1R18	A1R18
RX5	A2R6	A2R6	A2R6	A1R14	A1R13	A1R13	A1R13	R3	R3	R3
RX6	A2R3	A2R3	A2R3	A1R16	A1R21	A1R21	A1R21	R5	P5	P5
RX7	A2R4	A2R4	A2R4	A1R17	A1R22	A1R22	A1R22	A1R21	A1R21	A1R21
RX8	A2R2	A2R2	A2R2	A1R15	A1R20	A1R20	A1R20	A1R19	A1R19	A1R19
RX9	A2R2A	A2R2A	A2R2A	A1R15A	A1R20A	A1R20A	A1R20A	A1R19A	A1R19A	A1R19A
RX10	A1R13	A1R8	A1R7	A1R7	A1R11	A1R11	A1R11	A1R10	A1R10	A1R10
CX1	A2C1	A2C1	A2C1	A1C5	A1C5	A1C5	A1C5	A1C6	A1C6	A1C6
QX1	Q1	A3Q1	A3Q1	A2Q1	A2Q1	A2Q1	A3Q1	A2Q1	A2Q1	A2Q1
	—	—	—	—	—	—	—	A3Q1	A3Q1	A3Q1
QX2	NA	A3Q2	A3Q3	A2Q4	A2Q4	A2Q4	A3Q7	A2Q6	A2Q8	A2Q9
	—	—	—	—	—	—	—	A2Q5	A3Q7	A3Q9
QX3	A1Q3	A1Q3	A1Q2	A1Q3	A1Q3	A1Q3	A1Q3	A1Q3	A1Q3	A1Q3
QX4	A1Q5	A1Q1	A1Q1	A1Q2	A1Q2	A1Q2	A1Q2	A1Q2	A1Q2	A1Q2
QX5	NA	A1Q2	A3Q4	A1Q1	A1Q1	A1Q1	A1Q1	A1Q1	A1Q1	A1Q1
QX6	NA	NA	NA	NA	A2Q5	A2Q5	A3Q8	A3Q6	A3Q8	A2Q10
	—	—	—	—	—	—	—	—	—	A3Q10


NOTES
* SEE SPARE PARTS LIST FOR INDIVIDUAL COMPONENT VALUES.
UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2 W.
ALL VALUES WITH-IN PARENTHESES DENOTES A NJE PART NO.
A1 (MAIN CKT CARD)
T1*
CR1 (114386)
C1 100UF 35V
R2 560
R1 220 3W
R13 2500 3W
R12 JUMPER
R14 1000 3W
C4 25UF 15V
R15 2500 3W
CR6 (113931) 12V
Q1 (114368)
Q3 (114322)
R11 820
IC-1 UA723C
C3 1UF 250V
Q2 *
R4 1000
JUMPER
A2 (OVP CKT CARD)
R6 220
R5 2200
R7 270
R9 220
R10 *
R8 1000 1/4 W
CURRENT ADJ
R1 *
R2A *
R2 *
SCR1 (114722)
R3 1K 2W
OVP ADJ
VOLT ADJ
R6 *
SUS1 (114164)
R4 1.2K 3W
C1 .1UF 250V
C2 .01UF 250V
R5 470
P/O A1
TB1
F1 1.5SB
AC
220V OPTION (SEE MANUAL)
INPUT (SEE MANUAL)
G
C1 .22UF 250V
CR1 * USE ON 5V UNIT ONLY
C2 *
R3 *
F2 *
Q1 & Q2 *
R1 & R2 *
A3 (HEAT SINK ASSY)
R16 *
C5 *
P/O TB1
POS OUT
POS SENS
NEG SENS
NEG OUT
+
+S
-S
-
OUTPUT (SEE MANUAL)
TO T1 PIN 7
A1 (PIN 11)
(A1 PIN 14)
TO T1 PIN 9
CR1 * USE ON 10V THRU 15V UNITS ONLY
TO T1 PIN 7
TO T1 PIN 8
CR4
CR2
CR5
CR3
C2 (REF)
USE CR2 THRU CR5 ON 18V THRU 48V UNITS
SCHEMATIC DIAGRAM
RSB 5V THRU 48V
NJE CORPORATION
CODE IDENT. NO. 98380
305360

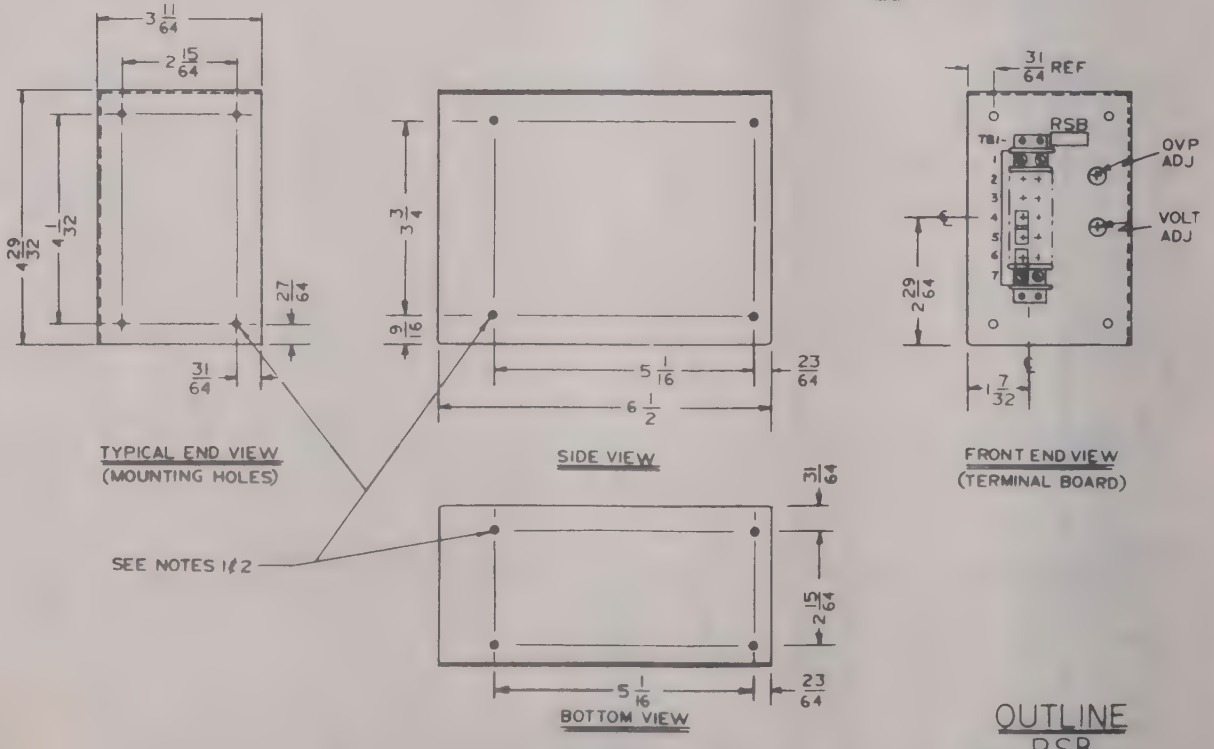
TBI TERMINAL BOARD LEGEND

TERM. NO.	SCREENED FUNCTION	RECOM'D WIRE SIZE	REMARKS
1	AC	NO. 20 AWG	AC
2	AC	NO. 20 AWG	AC RETURN
3	G	NO. 20 AWG	GROUND
4	+	NO. 18 AWG	POSITIVE OUT
5	+S	NO. 20 AWG	NORMALLY JUMPED TO POS OUT
6	−S	NO. 20 AWG	NORMALLY JUMPED TO NEG OUT
7	−	NO. 18 AWG	NEGATIVE OUT

NOTES
1. NO. 8-32 THREADED HOLES FOR MOUNTING. 4 ON EACH END, 4 ON THE BOTTOM & 4 ON THE SIDE.
2. RECOMMENDED SCREW LENGTH IS 3/8" LONG PLUS THICKNESS OF MOUNTING SURFACE.
3. ALL DIMENSIONS ARE ± 1/64



TERMINAL BOARD END



OUTLINE RSB

NJE CORPORATION	SIZE	CODE IDENT NO. 98380	DWG NO. 114239
	SCALE	REV	SHEET

REF DES	DESCRIPTION		INDIVIDUAL NJE P/N AND VALUE BY MODEL VOLTAGE RATING									
			5V	10V	12V	15V	18V	20V	24V	28V	36V	48V
A1	MAIN CIRCUIT CARD ASSEMBLY	P/N	114212	114213	114214	114215	114216	114217	114218	114219	114220	114221
		VALUE	-	-	-	-	-	-	-	-	-	-
A2	OVP CIRCUIT CARD ASSEMBLY	P/N	115507	115508	115509	115510	115511	115512	115513	115514	115515	115516
		VALUE	-	-	-	-	-	-	-	-	-	-
A3	TRANSISTOR HEAT SINK ASSEMBLY	P/N	114826	114827	114827	114827	114828	114828	114829	114829	114830	114831
		VALUE	-	-	-	-	-	-	-	-	-	-
C1	CAPACITOR FIXED FOIL	P/N	505481	←							→	505481
		VALUE	.22UF,250V									.22UF,250V
CR1	DIODE BRIDGE	P/N	114733	114733	114733	114733	NOT	NOT	NOT	NOT	NOT	NOT
		VALUE	25A	25A	25A	25A	USED	USED	USED	USED	USED	USED
F1	FUSE CARTRIDGE	P/N	3679	←							→	3679
		VALUE	1.5A,125V									1.5A,125V
F2	FUSE CARTRIDGE	P/N	114690	114689	114689	3671	114721	114721	114732	114732	114732	114731
		VALUE	8A, 32V	6A, 32V	6A, 32V	5A, 32V	4A, 32V	4A, 32V	3A, 250V	3A, 250V	3A, 250V	2A, 250V
T1	TRANSFORMER	P/N	210166	210165	210164	210163	210162	210161	210160	210159	210158	210157
		VALUE	-	-	-	-	-	-	-	-	-	-
		P/N										
		VALUE										
		P/N										
		VALUE										
		P/N										
		VALUE										
		P/N										
		VALUE										
		P/N										
		VALUE										
		P/N										
		VALUE										

N J E Corp.

Spare Parts List

MAIN CIRCUIT CARD

MODEL PSB PAGE 1 OF 2

REF DES	DESCRIPTION		INDIVIDUAL NJE P/N AND VALUE BY MODEL VOLTAGE RATING									
			5V	10V	12V	15V	18V	20V	24V	28V	36V	48V
A1 C1	CAPACITOR FIXED ELECT.	P/N	114015	←								114015
		VALUE	100UF,35V									100UF,35V
A1 C2	CAPACITOR FIXED ELECT.	P/N	114691	114693	114693	114694	114694	114694	114695	114695	114696	114698
		VALUE	30K, 15V	19.5K,25V	19.5K,25V	10.6K,40V	10.6K,40V	10.6K,40V	8K, 50V	8K, 50V	4.6K, 75V	2.5K,100V
A1 C3	CAPACITOR FIXED FOIL	P/N	5480	←							→	5480
		VALUE	.1UF,250V									.1UF,250V
A1 C4	CAPACITOR FIXED ELECT.	P/N	500656	←							→	500656
		VALUE	25UF, 15V									25UF, 15V
A1 C5	CAPACITOR FIXED ELECT.	P/N	114154	114154	114154	114154	114154	114154	114154	114154	114700	114700
		VALUE	2.2K, 40V	2.2K, 40V	2.2K,40V	2.2K, 40V	2.2K, 40V	2.2K, 40V	2.2K,40V	2.2K,40V	1K, 75V	1K,75V
A1 CR1	DIODE BRIDGE	P/N	114386	←							→	114386
		VALUE	1.5A,200V									1.5A,200V
A1 CR2 CR5	DIODE	P/N	NOT	NOT	NOT	NOT	113464	113464	113464	113464	113464	113464
		VALUE	USED	USED	USED	USED	5A, 100V	5A, 100V	5A, 100V	5A, 100V	5A, 100V	5A, 100V
A1 CR6	DIODE ZENER	P/N	113931	←							→	113931
		VALUE	1W, 12V									1W, 12V
A1 IC1	INTERGRATED CIRCUIT	P/N	114232	←							→	114232
		VALUE	UA723C									UA723C
A1 Q1	TRANSISTOR NPN SI	P/N	114368	←							→	114368
		VALUE	2N2222A									2N2222A
A1 Q2	TRANSISTOR NPN SI	P/N	505256	505256	505256	505256	505256	505256	505469	505469	505434	505434
		VALUE	40250	40250	40250	40250	40250	40250	2N3054	2N3054	2N3441	2N3441
A1 Q3	TRANSISTOR PNP SI	P/N	114322	←							→	114322
		VALUE	2N2907A									2N2907A
A1 R1	RESISTOR FIXED W W	P/N	110622	←							→	110622
		VALUE	220, 3W									220, 3W
A1 R2	RESISTOR FIXED COMP.	P/N		←							→	
		VALUE	560,1/2W									560, 1/2W

N J E Corp. — Spare Parts List

MODEL PSB PAGE 2 OF 2

REF DES	DESCRIPTION		INDIVIDUAL NJE P/N AND VALUE BY MODEL VOLTAGE RATING									
			5V	10V	12V	15V	18V	20V	24V	28V	36V	48V
A1 R3	RESISTOR FIXED W W	P/N	501630	501649	501649	501660	501660	501660	501660	501660	501664	501666
		VALUE	200, 3W	1K, 3W	1K, 3W	3K, 3W	3K, 3W	3K, 3W	3K, 3W	3K, 3W	5K, 3W	6K, 3W
A1 R4	RESISTOR FIXED COMP.	P/N	-	←							→	-
		VALUE	1K, 1/2W									1K, 1/2W
A1 R5	RESISTOR FIXED COMP.	P/N	-	←							→	-
		VALUE	2.2K,1/2W									2.2K,1/2W
A1 R6	RESISTOR FIXED COMP.	P/N	-	←							→	-
		VALUE	220Ω,1/2W									220Ω,1/2W
A1 R7	RESISTOR FIXED COMP	P/N	-	←							→	-
		VALUE	270Ω,1/2W									270Ω,1/2W
A1 R8	POT CARBON	P/N	113658	←							→	113658
		VALUE	1K, 1/4W									1K, 1/4W
A1 R9	RESISTOR FIXED COMP.	P/N	-	←							→	-
		VALUE	220Ω,1/2W									220Ω,1/2W
A1 R10	RESISTOR FIXED COMP.	P/N	-	-	-	-	-	-	-	-	-	-
		VALUE	2K, 1/2W	4.7K,1/2W	5.1K,1/2W	6.8K,1/2W	9.1K,1/2W	10K,1/2W	11K,1/2W	15K, 1/2W	18K,1/2W	22K,1/2W
A1 R11	RESISTOR FIXED COMP.	P/N	-	←							→	-
		VALUE	820Ω,1/2W									820Ω,1/2W
A1 R12	JUMPER WIRE	P/N	107983	←							→	107983
		VALUE	-									-
A1 P13	RESISTOR FIXED W W	P/N	501658	←							→	501658
		VALUE	2.5K,3W									2.5K,3W
A1 P14	RESISTOR FIXED W W	P/N	501649	←							→	501649
		VALUE	1K, 3W									1K, 3W
A1 P15	RESISTOR FIXED W W	P/N	501658	←							→	501658
		VALUE	2.5K,3W									2.5K, 3W
A1 P16	RESISTOR FIXED W W	P/N	110620	501630	501630	501634	504599	504599	501639	501640	505050	501660
		VALUE	100Ω,3W	200Ω,3W	200Ω,3W	300Ω,3W	400Ω,3W	400Ω,3W	500Ω,3W	620Ω,3W	1.5K, 3W	3K, 3W

115E00

N J E Corp.

Spare Parts List — OVP Circuit Card

MODEL RSB/C PAGE 1 OF 1

REF DES	DESCRIPTION		INDIVIDUAL NJE P/N AND VALUE BY MODEL VOLTAGE RATING									
			5V	10V	12V	15V	18V	20V	24V	28V	36V	48V
A2 C1	CAPACITOR FIXED FOIL	P/N	5480	←	←	←	←	←	←	←	←	5480
		VALUE	.1UF,250V	←	←	←	←	←	←	←	←	.1UF,250V
A2 C2	CAPACITOR FIXED FOIL	P/N	5483	←	←	←	←	←	←	←	←	5483
		VALUE	.01UF,250V	←	←	←	←	←	←	←	←	.01UF,250
A2 R1	RESISTOR FIXED W W	P/N	501660	500097	501665	501667	501669	501671	114567	501672	114568	113898
		VALUE	3K, 3W	4.7K, 3W	5.6K, 3W	6.8K, 3W	8K, 3W	9K, 3W	11K, 3W	12K, 3W	16.5K, 3W	22K, 3W
A2 R2	RESISTOR FIXED W W	P/N	NOT	NOT	501641	505050	501655	501658	501660	500097	501666	501671
		VALUE	USED	USED	640Ω, 3W	1.5K, 3W	2K, 3W	2.5K, 3W	3K, 3W	4.7K, 3W	6K, 3W	9K, 3W
A2 R2A	RESISTOR FIXED COMP.	P/N	-	501659	NOT	NOT	NOT	NOT	NOT	NOT	NOT	NOT
		VALUE	1.5K,1/2W	2.7K, 3W	USED	USED	USED	USED	USED	USED	USED	USED
A2 R3	POT W W	P/N	107442	←	←	←	←	←	←	←	←	107442
		VALUE	1K, 2W	←	←	←	←	←	←	←	←	1K, 2W
A2 R4	RESISTOR FIXED W W	P/N	505185	←	←	←	←	←	←	←	←	505185
		VALUE	1.2K, 3W	←	←	←	←	←	←	←	←	1.2K, 3W
A2 R5	RESISTOR FIXED COMP.	P/N	-	←	←	←	←	←	←	←	←	-
		VALUE	470Ω,1/2W	←	←	←	←	←	←	←	←	470Ω,1/2W
A2 R6	POT W W	P/N	107442	114564	114564	114564	114565	114565	114565	111818	111818	111818
		VALUE	1K, 2W	3K, 2W	3K, 2W	3K, 2W	4K, 2W	4K, 2W	4K, 2W	5K, 2W	5K, 2W	5K, 2W
A2 SCR1	RECTIFIER CONTROL	P/N	114722	←	←	←	←	←	←	←	←	114722
		VALUE	2A, 200V	←	←	←	←	←	←	←	←	2A, 200V
A2 SUS1	UNILATERIAL SWITCH	P/N	114164	←	←	←	←	←	←	←	←	114164
		VALUE	300MW, 1A	←	←	←	←	←	←	←	←	300MW, 1A
		P/N										
		VALUE										
		P/N										
		VALUE										
		P/N										
		VALUE										